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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/696,326	10/29/2003	Xun Zhang	064441.0266	6553

31625 7590 06/02/2005

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PATENT DEPARTMENT  
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AUSTIN, TX 78701-4039

EXAMINER
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ROSASCO, STEPHEN D

ART UNIT	PAPER NUMBER
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1756

DATE MAILED: 06/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/696,326

Applicant(s)

ZHANG ET AL.

Examiner

Stephen Rosasco

Art Unit

1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 01 November 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-34 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 3/22/04 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 10/15/04, 11/01/04.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### Detailed Action

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Storm (6,103,427) in view of Hoke et al. (6,555,079).

The claimed invention is directed to a photomask assembly and a method of protecting a photomask, the photomask assembly comprising a pellicle assembly including a pellicle frame and a pellicle film coupled to a first surface of the pellicle frame, the pellicle frame including an inner wall and an outer wall; a photomask coupled to a second surface of the pellicle frame opposite the pellicle film; and a molecular sieve associated with the pellicle assembly, the molecular sieve operable to prevent airborne molecular contaminants (AMCs) generated during a lithography process from contaminating the photomask, and formed of a catalytic material operable to decompose the AMCs into smaller particles.

And further comprising the molecular sieve formed on an inner wall of the pellicle frame and formed of a surface adsorption material operable to absorb the AMCs without generating other contaminants, selected from the group consisting of metals, metal salts, metal oxides, composite compounds, polymers and organic compounds, wherein the pores comprise a size between approximately five Angstroms and approximately two-hundred Angstroms and including the high surface area material selected from the group consisting of high purity silica zeolite, sol-gel silica and macroporous polymers.

The applicant discusses the limitations of the prior art in that the semiconductor industry currently implements many techniques to protect photomask assemblies and photomask

manufacturing tools from fine particles that have sizes in the microns. AMCs, however, may have sizes in the Angstroms and the conventional techniques may not be effective for eliminating contamination. For example, a conventional particulate filter may have a pore diameter of approximately 0.3 microns that allows AMCs, which may be as small as ten Angstroms, to pass through the filter into the photomask assembly or lithography tool.

[0008] One conventional technique used to remove particulates includes a chemical filter placed in a pellicle frame. The material forming the chemical filter may bind with the particulate matter in a chemical reaction to form a new composition. The new composition, however, may become another source of contamination. Additionally, the chemical filter may reach a saturation limit and stop reacting with the particulate matter, at which point the chemical filter no longer prevents the particulate matter from contaminating the lithography tools.

[0009] Vent holes formed in the pellicle frame may also be an access point for particulate matter and AMCs to enter the area between the pellicle film and the photomask. Conventional techniques of preventing particles from passing through the vent hole include adding filter sheets in the vent hold to block contaminants from entering the space under the pellicle film. Typically, these filter sheets have pore sizes that block particulates in the range of approximately 0.5  $\mu\text{m}$  or greater and molecular contaminants in the range of approximately 0.02  $\mu\text{m}$  or greater. Thus, molecular contaminants that are smaller than 0.02  $\mu\text{m}$  may pass through the conventional filter.

Storm teaches a pattern mask pellicle comprising a transparent film extending across the top peripheral surface of a frame; and

a peripheral gasket adhered to the bottom peripheral surface of the frame and the frame and gasket assembly including a pressure relieving particle contamination means consisting of

Art Unit: 1756

one tacky, continuous, tortuous path connecting an opening in the interior wall of the assembly with an opening in the exterior wall of the assembly.

And wherein the path and openings comprise a continuous, tortuous groove or slot in the gasket.

And wherein the path and openings comprise a continuous tortuous groove in the bottom peripheral surface of the frame.

The teachings of Storm differ from those of the applicant in that the applicant teaches the use of a molecular sieve associated with the pellicle assembly, the molecular sieve operable to prevent airborne molecular contaminants (AMCs) generated during a lithography process from contaminating the photomask, and formed of a catalytic material operable to decompose the AMCs into smaller particles.

Hoke et al. teach a method of cleaning the atmosphere by adsorbing pollutants contained in the atmosphere comprising contacting the pollutant-containing atmosphere with an outer surface of a substrate which has been coated with an adsorptive material to render said surface capable of adsorbing said pollutants; wherein the coated surface has been protected with an overcoat of at least one protective material which is sufficiently porous to enable said pollutants to pass therethrough into operative contact with the adsorptive material and sufficiently protective to prevent harmful contaminants from contacting the adsorptive material.

And wherein the overcoated surface has been coated with at least one hydrophobic protective substance which is capable of substantially preventing liquid water and/or water vapor from reaching the adsorptive material.

And wherein the protective material and the hydrophobic protective substance are contained within at least one single layer.

And wherein the adsorptive material is selected from the group consisting of zeolites, carbon, Group IIA metal oxides and mixtures thereof.

And wherein the adsorptive material is a Group IIA metal oxide.

And wherein the adsorptive material is a zeolite.

And wherein the protective material is selected from the group consisting of clays, alumina, silica, alkaline earth oxides, rare earth oxides, carbon, inert metal oxides and mixtures thereof.

It would have been obvious to one having ordinary skill in the art to take the teachings of Storm and combine them with the teachings of Hoke et al. in order to make the claimed invention because the use of molecular sieve for adsorbing AMCs is well known in any art which requires a gas vacuum or pressure differential across a membrane to be maintained, or requires the residual air environment to be free of these contaminants and they are also used in the clean room environments in which the masks pellicle assemblies are made.

### **Conclusion**

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Stephen Rosasco whose telephone number is (571) 272-1389. The Examiner can normally be reached Monday-Friday, from 8:00 AM to 4:30 PM. The Examiner's supervisor, Mark Huff, can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



S. Rosasco  
Primary Examiner  
Art Unit 1756